Description of Practice and Outcomes in Healthcare-associated Pneumonia without a Microbiologic Diagnosis in Non-ventilated Patients

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Abstract (updated)

Background: Patients with health care-associated pneumonia (HCAP) are typically started on empiric broad-spectrum (BS) antibiotics. Limited data exists on how to de-escalate antibiotics if a microbiologic diagnosis is never made.

Methods: We retrospectively identified hospitalized patients treated for HCAP at the Roudebush VAMC between 1/1/2011 and 12/31/2012. All cases met the definition of HCAP: 1) a new radiographic infiltrate, 2) signs/symptoms of pneumonia, and 3) at least one risk factor for a multidrug-resistant (MDR) pathogen. Patients receiving mechanical ventilation at the time of diagnosis were excluded. Broad-spectrum (BS) therapy was defined as a combination of anti-pseudomonal and anti-MRSA antibiotics. De-escalation involved a switch to or discontinuation of an agent resulting in a narrower spectrum of coverage.

Results: A total of 113 patients were included in the analysis. The mean age was 71 years; 111 (98%) were men. Blood cultures were obtained from 103 patients (91%); sputum cultures were obtained from 47 (42%), and bronchoalveolar lavage was performed in 2 (2%). The sputum specimen was graded as fair in 61% and good in 32%. Of patients with a pathogen identified, 9/26 (35%) were MDR. Overall, 87 patients (76%) had no pathogen identified. The median duration of total antibiotics was 10 days (IQR 8-14). Antibiotics were de-escalated in 75/85 (88%) of cases who were started on BS therapy. The median time to de-escalation was 3 days (IQR 2-4).De-escalation was performed in 54/65 (83%) of patients without a pathogen identified. The narrower regimen was parenteral in 8 (15%) and oral in 46 (85%). Among patients without a microbiologic diagnosis, vancomycin was more commonly stopped when the MRSA nasal-swab was negative instead of positive (72% vs. 29%, p=0.03). Compared to patients with a microbiologic diagnosis, patients without a microbiologic diagnosis who were de-escalated had comparable rates of mortality and readmission at one-month: mortality 14% vs. 12%, readmission 21% vs. 24%.

Conclusion: A microbiologic diagnosis was infrequently made in cases of HCAP. In the absence of a microbiologic diagnosis, physicians safely de-escalated antibiotic therapy. The effectiveness of this approach may reflect low rates of antibiotic resistance in the study cohort.

Introduction

In 2005, the ATS/IDSA guidelines on hospital-acquired pneumonia incorporated the concept of healthcare-associated pneumonia (HCAP) for the first time (1). The guidelines called for broad-spectrum antibiotic therapy in patients who met the definition of healthcare-associated pneumonia and encouraged the use of respiratory cultures to help de-escalate therapy. One problem with this approach, however, is that only 1/3 of non-ventilated patients are able to provide an adequate sputum sample, and half of these samples fail to yield a predominant organism (2). In the absence of a respiratory culture, some practitioners are comfortable choosing a more narrow antibiotic to finish a course of therapy while others choose to continue broad-spectrum antibiotics for a full week.

Prior studies have suggested that patients without a positive culture tend to have less severe disease, shorter hospital stays, and lower mortality rates (3). A small, retrospective study described good outcomes when patients with HCAP were de-escalated to a respiratory fluoroquinolone (4). Since there is no accepted approach to de-escalation in these patients, further research is needed to identify which patients require a full course of broad-spectrum therapy and which ones do not.

In addition, little data has been presented describing the practice of antibiotic de-escalation in the treatment of culture negative HCAP in a clinical setting. This study seeks to further examine antibiotics de-escalation in practice and its outcomes.

Objectives

1. To describe the treatment of HCAP in patients hospitalized at the Richard Roudebush VAMC.
2. To identify factors associated with de-escalation of antibiotics in patients with HCAP

Methods

Patient Selection

Between the dates of 9/1/2010 and 9/1/2012, eligible cases were identified using ICD-9 codes for pneumonia. Each chart was reviewed to determine if the **criteria for HCAP** were met. To qualify, each case met at least one of the following criteria:

- Pneumonia that developed after 4 full days of hospitalization
- Admitted from a nursing home, rehab hospital, or other long-term care facility
- Previously hospitalized within the past 90 days
- Receiving outpatient hemodialysis, peritoneal dialysis, or infusion therapy requiring regular visits to a hospital-based clinic
- Received recent intravenous antibiotic therapy, chemotherapy, or wound care within the past 30 days of the current admission

The **diagnosis of HCAP** was verified by the presence of a new radiographic infiltrate plus at least 2 of the following:

- WBC count >10K or <4K
- Temperature > 38.3 or <=36
- Purulent secretions from the lower respiratory tract
- Ratio of partial pressure of arterial oxygen to the inspired fraction of oxygen (PaO2/FiO2) < 300

Exclusions

Patients were excluded if infiltrates resolved within 48 hours and/or after diuresis, if there were other infections in addition to pneumonia, and if they were ventilated within 48 hours of the onset of infection. For patients with multiple hospitalizations for pneumonia, only the initial hospitalization was reviewed.

Culture Positive HCAP

Culture-positive HCAP was defined as a case of HCAP in whom 1) a pathogenic organism grew on sputum, tracheal aspirate, or BAL; 2) bacteria that grew in blood cultures were logical respiratory pathogens and no other source for the blood cultures were identified; or 3) a positive urine antigen for Legionella species. If the patient did not meet criteria for culture-positive HCAP, the case was labeled as culture-negative HCAP. Multi-drug resistant (MDR) organisms were defined as organisms resistant to ≥2 classes of antibiotics.

Disease Severity

A PSI score was calculated for each patient at the time of HCAP diagnosis.

Antibiotic Therapy

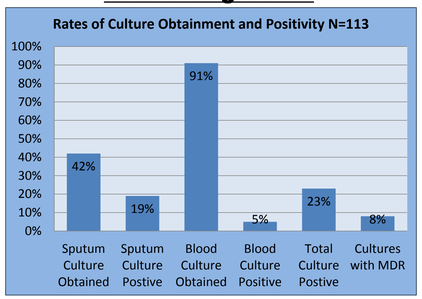
Antibiotic therapy was recorded, including any changes in therapy. Escalation of therapy was defined as a switch to or addition of an antimicrobial agent with a broader spectrum of action. De-escalation of therapy was defined as a switch to or discontinuation of a drug class resulting in a less broad spectrum of coverage. Broad spectrum coverage was defined as an anti-MRSA agent and anti-pseudomonal coverage.

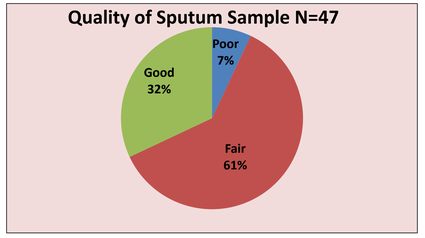
Results

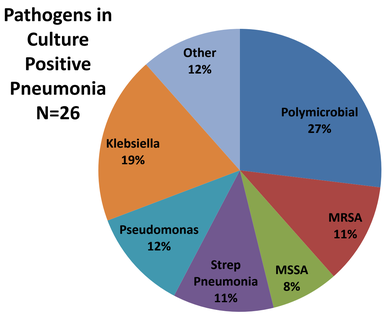
Baseline Characteristics in Patients with HCAP (N=113, collected between 1/1/2011 and 12/31/2012)

	N (%)
Male gender	111 (98%)
Age (mean)	71 years (50– 95)
Race	
White	95 (86%)
Black	14 (13%)
Co-morbidities	
COPD	58 (51%)
Diabetes mellitus	49 (43%)
Malignancy	45 (39%)
Congestive heart failure	37 (32%)
Current Tobacco use	27 (24%)
Cirrhosis	13 (12%)
ESRD	10 (9%)
>1 risk factor for multidrug-resistance	65 (58%)
PSI (mean)	126 (65-209)

Microbiologic Data







Treatment Data

Duration and De-escalation of Antibiotics

Median Duration of Antibiotics (days)	10 (IQR 8-14)
Broad Spectrum Therapy	85/113 (75%)
De-escalation after BS therapy	75/85 (88%)
De-escalation after BS therapy, culture negative	54/65 (83%)
Median Days to De-escalation	3 (IQR 2-4)

Role of MRSA Screening

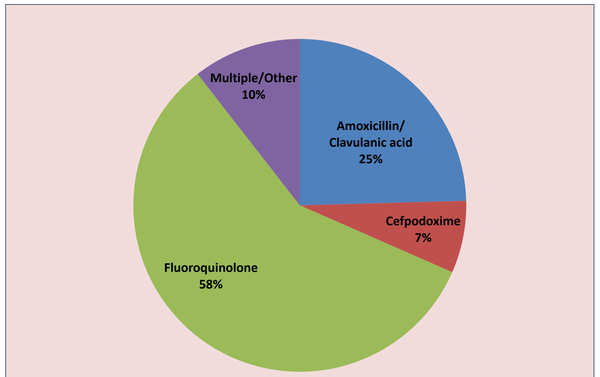
Vancomycin was more commonly stopped within 4 days when the admission MRSA nasal-swab was negative instead of positive (72% vs. 29%, p=0.03).

Factors Predictive of De-escalation in Patients Started on Broad Spectrum Antibiotics

Factors Influencing De-escalation	N with Factor De-escalated (%)	N w/o Factor de-escalated (%)	P Value
>1 risk factor for MDR	39/47 (83%)	35/37 (95%)	0.10
Culture Positive	17/17 (100%)	57/67 (85%)	0.20
ICU admission	33/40 (83%)	41/44 (93%)	0.18

	De-escalated	Not De-escalated	P value
Age in Years (mean)	69	76	<0.05
PSI score (mean)	134	128	0.70

Antibiotic Choice for De-escalation to Oral Therapy after Broad-Spectrum Therapy N=57



In 88% of these patients, no pathogen was identified.

Clinical Outcomes

	Group 1: Microbiologic diagnosis (n=17)	Group 2: No microbiologic diagnosis but de-escalated (n=58)	Group 3: No microbiologic diagnosis and not de-escalated (n=8)	p-value (comparing groups 1 and 2)
One-month mortality	12%	14%	0	1.00
Readmitted within one month of diagnosis	24%	21%	9%	0.75

Summary

Culture Collection

- Sputum cultures were obtained in 42% of patients and revealed a probable pathogen in 47% of those obtained.
- Blood cultures were obtained in 91% with a 6% rate of positivity.

Antibiotic Treatment

- Broad spectrum therapy was started in 75% of cases. Of these cases, 88% were de-escalated.
- Median time to de-escalation was 3 days.
- De-escalation was performed more commonly in patients with a younger age.
- Vancomycin was more commonly stopped within 4 days of initiation when the admission MRSA nasal-swab was negative

Outcome

- In the absence of a microbiologic diagnosis, physicians safely de-escalated antibiotic therapy.

References:

1. Kollef MH et al. Health care-associated pneumonia (HCAP): a critical appraisal to improve identification, management and outcomes: proceedings of the HCAP summit. Clin Infect Dis 2008 Apr 15; 46 Suppl 4: S296-334.
2. Garcia-Vazquez E, et al. Arch Intern Med 2004; 164(16): 1807-11.
3. Labelle AJ, Arnold H, Reichley RM, Micek ST, Kollef MH. A comparison of culture-positive and culture-negative healthcare-associated pneumonia. Chest. 2010;137:1130-1137.
4. Schlueter M, et al. Practice patterns for antibiotic de-escalation in culture-negative healthcare-associated pneumonia. Infection 2010 Oct; 38 (5): 357-62.